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COMPASS, AMBER and LHCspin Fixed Target Experiments at CERN: Highlights for TMD Measurements Today and in the Future

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COMPASS is currently the longest-running experiment at CERN, having collected physics data for a record-breaking 20 years from 2002 to 2022. The experiment has a unique and diverse physics program focused on nucleon structure and spectroscopy measurements.

The experimental results obtained by COMPASS during its two phases (2002-2011 and 2012-2022, respectively) for a wide range of quark transverse momentum dependent DIS and Drell-Yan measurements play an essential role in the general understanding of the three-dimensional nature of the nucleon. In 2022, the experiment performed its final highly successful data taking dedicated to the study of TMD phenomena in semi-inclusive measurements of hadron production in DIS using a high energy muon beam and a transversely polarized deuteron target.

This talk will provide a comprehensive review of recent advancements in COMPASS nucleon spin structure studies and will offer insights into future prospects.

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